



United Kingdom of Great Britain and Northern Ireland

EDICT OF GOVERNMENT

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BS NA EN 1998-4 (2006) (English): UK National
Annex to Eurocode 8. Design of structures for
earthquake resistance. Silos, tanks and pipelines

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MAGNA CARTA (1297)

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NATIONAL ANNEX

**UK National Annex to
Eurocode 8: Design of
structures for
earthquake resistance –
Part 4: Silos, tanks and pipelines**

ICS 91.120.25



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Summary of pages

This document comprises a front cover, an inside front cover,
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National Annex (informative) to BS EN 1998-4:2006, Eurocode 8: Design of structures for earthquake resistance – Part 4: Silos, tanks and pipelines

Introduction

This National Annex has been prepared by BSI Subcommittee B/525/8, *Structures in seismic regions*. In the UK it is to be used in conjunction with BS EN 1998-4:2006.

NA.1 Scope

This National Annex gives:

- a) the UK decisions for the Nationally Determined Parameters described in the following subclauses of BS EN 1998-4:2006:
 - 1.1(4)
 - 2.1.2(4)P
 - 2.1.3(5)P
 - 2.1.4(8)
 - 2.2(3)
 - 2.3.3.3(2)P
 - 2.5.2(3)P
 - 3.1(2)P
 - 4.5.1.3(3)
 - 4.5.2.3(2)P
- b) the UK decisions on the status of BS EN 1998-4:2006 informative annexes;
- c) references to non-contradictory complementary information.

NA.2 Nationally Determined Parameters

UK decisions for the Nationally Determined Parameters described in BS EN 1998-4:2006 are given in Table NA.1.

Table NA.1 UK values for Nationally Determined Parameters described in BS EN 1998-4:2006

Subclause	Nationally Determined Parameter	Eurocode recommendation	UK decision
1.1(4)	Additional requirements for facilities associated with large risks to the population or the environment.	[None]	A site-specific hazard analysis should be performed.
2.1.2(4)P	Reference return period T_{NCR} of seismic action for the ultimate limit state (or, equivalently, reference probability of exceedence in 50 years, P_{NCR}).	$T_{NCR} = 475$ years	In the absence of a site-specific assessment, adopt a return period T_{NCR} of 2 500 years. Further guidance is given in PD 6698.
2.1.3(5)P	Reference return period T_{DLR} of seismic action for the damage limitation state (or, equivalently, reference probability of exceedence in 10 years, P_{DLR}).	$T_{DLR} = 95$ years $P_{DLR} = 10\%$	In the absence of a project-specific assessment, adopt the recommended values. Further guidance is given in PD 6698.
2.1.4(8)	Importance factors for silos, tanks and pipelines.	Class I: $\chi = 0,8$ Class III: $\chi = 1,2$ Class IV: $\chi = 1,6$	Where a value for the reference return period T_{NCR} of 2 500 years has been adopted for CC3 structures, $\gamma_I = 1$ should be assumed. Where T_{NCR} has been assessed on a project-specific basis, γ_I should also be chosen on a project-specific basis. Further guidance is given in PD 6698.
2.2(3)	Reduction factor ν for the effects of the seismic action relevant to the damage limitation state.	Class I & II: $\nu = 0,4$ Class III & IV: $\nu = 0,5$	In the absence of a project-specific assessment, adopt the recommended values. Further guidance is given in PD 6698.
2.3.3.3(2)P	Maximum value of radiation damping for soil structure interaction analysis, ξ_{max} .	$\xi_{max} = 25\%$	Use the recommended value.
2.5.2(3)P	Ratio ϕ of coefficient ψ_{E1} on variable mass used in seismic analysis to combination coefficient $\psi_{2,1}$ for quasi permanent values of variable actions for silos, tanks and pipelines.	$\phi = 0$ for empty silo, tank or pipeline $\phi = 1$ for full silo, tank or pipeline	Use the recommended values.
3.1(2)P	Unit weight of the particulate solid in silos, γ in the seismic design situation.	$\gamma = \gamma_u$, upper bound characteristic value of unit weight from BS EN 1991-4: 2006, Table E1	Use the recommended value.
4.5.1.3(3)	Amplification factor γ_{p1} on forces transmitted by the piping to region of attachment on the tank wall, for the design of the region to remain elastic in the damage limitation state.	$\gamma_{p1} = 1,3$	Use the recommended value.
4.5.2.3(2)P	Overstrength factor γ_{p2} on design resistance of piping in the verification that the connection of the piping to the tank will not yield prior to the piping in the ultimate limit state.	$\gamma_{p2} = 1,3$	Use the recommended value.

NA.3 Decisions on the status of the informative annexes

NA.3.1 Seismic analysis procedures for tanks [BS EN 1998-4:2006, Annex A]

BS EN 1998-4:2006 informative Annex A may be used in the UK.

NA.3.2 Buried pipelines [BS EN 1998-4:2006, Annex B]

BS EN 1998-4:2006 informative Annex B may be used in the UK.

NA.4 References to non-contradictory complementary information

The following is a list of references that contain non-contradictory complementary information for use with BS EN 1998-4:2006.

- PD 6698:2008, *Background paper to the UK National Annexes to BS EN 1998-1, BS EN 1998-2, BS EN 1998-4, BS EN 1998-5 and BS EN 1998-6.*

Bibliography

Standards publications

BS EN 1991-4:2006, *Eurocode 1 – Actions on structures – Part 4: Silos and tanks*

BS EN 1998-4:2006, *Eurocode 8 – Design of structures for earthquake resistance – Part 4: Silos, tanks and pipelines*

PD 6698:2008, *Background paper to the UK National Annexes to BS EN 1998-1, BS EN 1998-2, BS EN 1998-4, BS EN 1998-5 and BS EN 1998-6*

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